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ABSTRACT

The National Science Foundation is sponsoring 26 Statewide Systemic Initiative Projects to promote innovative curricula for teaching mathematics and science. A plan for evaluating and assessing systemic change has been designed and implemented at one of them in Puerto Rico. The perspective used to guide this paper is based on the principles that constituted the vision for this particular project. Subjects were 117 male and 102 female seventh graders who completed a study questionnaire. The relationships between the students' socioeconomic backgrounds and their scores on pretests and posttests of attitudes, science, and mathematics and final course grades were investigated as well as the relationship between their final course grades and scores on the posttests. The degree of teacher empowerment of participating teachers was examined. A strong relationship was found between final course grades and posttest scores. No relationship was found between the students' socioeconomic background and the remaining variables. A high level of teacher empowerment was also found. Clear evidence was found that the implementation of a new curriculum can drive systemic reform. Two appendixes present student and teacher questionnaires in English and Spanish. (Contains 8 tables and 25 references.) (Author/SLD)

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Assessment of the Impact of a New Curriculum on Systemic Change

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Abstract

The National Science Foundation is sponsoring twenty-six Statewide Systemic Initiative Projects. A plan for evaluating and assessing systemic change has been designed and implemented at one of them. The perspective used to guide this paper is based on the principles which constitute the vision for this particular project. The relationship between the students' socio-economic background and (1) their scores on pre and post tests of attitudes, Science, and Mathematics; (2) final course grades was investigated as well as the relationship between their final course grades and scores on the post tests. The degree of teacher empowerment of participating teachers was examined. A strong relationship was found between final course grades and post-test scores. No relationship was found between the students' socio-economic background and the remaining variables. A high level of teacher empowerment was also found. Clear evidence was found that the implementation of a new curriculum can drive systemic reform.

Assessment of the Impact of a New Curriculum on Systemic Change

The National Science Foundation is sponsoring twenty-six Statewide Systemic Initiative (SSI) projects. These projects promote systemic change in education by (1) creating innovative curricula for the teaching of Science and Mathematics; (2) using authentic assessment methods in the evaluation of students and programs; and (3) establishing partnerships among key players at the local and state level. Because of the comprehensiveness and complexity of these projects, it is important to assess and measure systemic change occurring within the educational systems where SSI interventions are taking place.

Importance of the Study:

This study's importance lies in the design and implementation of an evaluation plan to assess the impact of a new curriculum on systemic change in one of several SSI projects sponsored by the National Science Foundation (grant no. OSR- 9250052). The results of this study indicated that the implementation of the new curriculum was driving systemic change and that the innovative strategies used to assess this change were appropriate for this task. Therefore, the results of this study should be disseminated for the benefit of other similar projects.

Objectives:

A plan for evaluating and assessing systemic change has been designed and implemented at one of the SSI projects. Among the main areas of interest in this plan feature: (1) the project's impact on curricular change and implementation; (2) the

active participation of teachers in the curriculum and their empowerment; (3) the measurement of long-range change in student performance; and (4) the transfer of authority to schools and their subsequent empowerment.

This paper is based on the design and implementation of this evaluation plan. However, because of the scope of this plan, the paper will address three main areas of interest: (1) the impact of a new curriculum which integrates Science and Mathematics following the precepts and standards of SS&C/NCTM on the performance of students from diverse socio-economic backgrounds; (2) the degree of empowerment of the teachers who are participating in the curriculum; and (3) the impact of these two elements on producing systemic change. The two remaining areas mentioned above will be addressed in future papers.

Perspective:

The evaluation plan and this paper are based on the following principles which constitute the vision for this particular SSI project. First, the state is responsible for building the scientific literacy and mathematical numeracy of all students. Second, the curriculum should promote the development of the students' higher order thinking skills and motivation following the "less is more" principle where an emphasis is placed on the students' depth of understanding and on their ability to become independent learners. Third, the teachers must feel empowered to play their critical role in the quality of Science and Mathematics education and create a positive learning environment for the students. Fourth, authentic assessment must be a part of the

learning experience because it is critical as a feedback mechanism for the transformation of the curriculum and of the system (Puerto Rico Systemic Statewide Initiative To Achieve Excellence in Science and Mathematics Education Plan of Action, 1991).

Theoretical Framework:

The interest in examining the impact of the curriculum on the performance of students arises from a review of the literature which addresses the relationship between student attitudes towards Science and Mathematics and their achievement in these subjects as well as their subsequent career choices in these areas. In reviewing this literature, the impact of the family on these areas was also found to be a significant predictor of attitudes and achievement; thus the importance of investigating the relationship of attitudes, achievement, and socio-economic background particularly because one of the project's main goals is "Science and Mathematics for all".

Because the school environment plays a critical role in the students' attitudes and achievement, the teachers' participation and impact as change agents within the system must be analyzed. Therefore, the degree of empowerment of the teachers who are participating in the curriculum was included in this study as part of the assessment of systemic change.

The literature consistently indicates that student attitudes towards a Science and/or Mathematics affect their performance or achievement in these areas since

typically when students have a better appreciation of an area they tend to develop better skills (Germann, 1988; Talton & Simpson, 1985; Cannon & Simpson, 1985; Willson, 1983). The students' self-perceptions of what they do in the classroom are another contributing factor which affects their performance according to Simpson & Troost (1982). Other investigators have also found that, even though the correlations between attitudes and achievement may some times appear to be low in some studies, student interest in the areas is related to achievement (Willson, 1983).
Unfortunately, positive attitudes towards Science and Mathematics tend to decline over time at the intermediate levels (Simpson & Oliver, 1990; Cannon & Simpson, 1985; Simpson & Oliver, 1984) thus possibly contributing to decreases in achievement and performance typically found at this developmental stage.

The classroom experience plays a key role in fostering attitudes towards Science and Mathematics and, according to some investigators (Simpson & Oliver, 1990; Eccles, 1989; Simpson & Oliver, 1984), the traditional classroom is not fostering positive attitudes towards these areas. These findings pose a problem for education in Science and Mathematics since the choices and experiences of the students at the intermediate level tend to determine their performance in later years and the number of courses in these areas which they are willing to take (Simpson & Oliver, 1990; Eccles, 1989). It is critical that the schools provide the best possible

learning environment for these students many of whom do not find that their needs are being met by the traditional methods (Eccles, Midgley, Wigfield, Buchanan, Reuman, Flanagan, & Mac Iver, 1993; Simpson & Oliver, 1990).

The parents' influence on the students' attitudes and achievement stems from various sources. Parents trasmit their own opinions and attitudes towards education in general and towards Science and Mathematics in particular to their children thus affecting their children's own attitudes and choices (Eccles, 1989; Simpson & Troost, 1982; Eccles-Parsons, Adler, & Kaczala, 1982). Often these opinions and attitudes indicate traditional gender biases favoring the importance of learning Science and Mathematics for their sons (Eccles, 1989; Eccles-Parsons et.al., 1982). These findings suggest evidence for the commonly found gender differences in attitudes and achievement in Science and Mathematics at the intermediate level (Eccles, 1989; Cannon & Simpson, 1985; Simpson & Oliver, 1984; Willson, 1983).

The parents create a home atmosphere which contributes to the students' motivation to learn typically by providing books and other educational materials (Reynolds & Walberg, 1991). Because these tend to be more available to families from these backgrounds, it is commonly assumed that students from higher socio-economic backgrounds tend to have more positive attitudes towards Science and Mathematics and to perform better in these areas than students from lower socio-economic backgrounds. Thus, the importance of investigating the relationship between parents' socio-economic background and students' attitude and achievement.

The teachers are key players in any effort of educational reform (Heller, 1993). Their role as change agents must be examined because of their direct impact on the students through the classroom experience. Their self-perceptions as change agents are important in this process since these perceptions contribute to their self-confidence (Kirby, Wimpelberg, & Keaster, 1992) which in turn affects their achievements. However, to be succesful change agents, teachers also need institutional support (Clark, 1992; Short & Rinehart, 1992). Therefore, these experiences must be examined from the teachers' point of view.

Recently, many researchers have described and defined the experience of teacher empowerment (Heller, 1993; Ferrara & Nepa, 1993; Monson & Monson; 1993; Raywid, 1993; Short & Rinehart, 1993; Clark, 1992; Short & Rinehart, 1992; Miles, Saxl, & Lieberman, 1988; Lightfoot, 1985; Little, 1982). Many of these researchers have also investigated specific suggested components of teacher empowerment.

Although the literature lacks a specific and widely accepted definition of teacher empowerment, this review revealed several components which were consistent across various writings emphasizing a sense of ownership within the teaching-learning process. These components refer to (1) autonomy; (2) accountability; (3) decision-making opportunities; (4) collegiality and collaboration; (5) mastery of content; (6) professional development opportunities; (7) self-assessment; and (8) institutional support. These components must be examined within the context in which the

teachers function since several researchers have suggested that teacher empowerment is context dependent (Clark, 1992; Short & Rinehart, 1992; Goldsmith & Nelson, 1991; Rappaport, 1987; Little, 1982).

This review underlines the importance of examining students' attitudes and achievement in Science and Mathematics as part of the assessment of the impact of a new curriculum on systemic change. The review also emphasizes the importance of the participation of the teacher as a change agent within these reform efforts.

Research Questions

The literature review revealed that the experiences of students and teachers must be studied within their particular contexts. To address these issues, the following research questions were formulated:

1. What is the relationship between the students' socio-economic background and their scores on the pre and post tests of attitudes, Science, and Mathematics? Are there any gender differences in this relationship?
2. What is the relationship between the students' socio-economic background and their final grades in Science and Mathematics? Are there any gender differences in this relationship?
3. What is the relationship between the students' final grades in Science and Mathematics and their scores on the post tests of attitudes, Science, and Mathematics? Are there any gender differences in this relationship?

4. What is the degree of teacher empowerment of the teachers who are currently participating in the Project? Are there any differences in this measure in terms of area, grade, or gender?

Method

Data Source:

The data have been provided by students and teachers from seven schools participating in an SSI project. The information provided by the participants is periodically reported to the schools and to the projects' administrators as part of the formative evaluation procedures as a means of providing feedback on the progress of the project.

Participants

From a total of approximately 1500 seventh-grade students from the seven pilot schools, a random sub-sample of approximately 30 students from each school was selected to complete the Questionnaire of Attitudes Towards Science and Mathematics in the 1992-93 school year. Two-hundred and thirty-eight students (117 male and 102 female) who completed the Questionnaire were included in this study.

All the teachers who are participating in the Project received the Teacher Empowerment Questionnaire. The response rate was of over 90%. Table 1 presents the description of the fifty-nine teachers who participated in the study.

Insert Table 1 about here

Measures, Instruments, and Procedure

In this study, information about the variables of interest has been collected through multiple measures from various sources to obtain a better understanding of the changes occurring within the system. For this reason, several instruments have been designed and revised to look at the two main areas of interest in this paper.

Student attitude change has been measured by designing (1) a protocol for semi-structured interviews and (2) a questionnaire about student interest in Science and Mathematics and administering it to the participating students using a pre/post design.

The protocol for the semi-structured interviews addresses the following areas: (1) interest in the Science and Mathematics courses; (2) changes in the conceptualization of Science and Mathematics; (3) application of what they learn in the classroom to their daily lives; (4) experiences with cooperative learning; and (5) reactions to the curricular activities and materials.

Between eight and ten randomly selected seventh-grade students participate in each group interview at each school which is typically conducted by the evaluation assistants at each school as part of the formative evaluation visits. A total of four interviews were conducted during the 1992-93 school year for a sample of approximately 280 students.

The Questionnaire of Attitudes Towards Science and Mathematics consists of twenty-eight statements to which the students respond in terms of a five-point scale reflecting their level of experience with the item where 5 = a lot and 1 = not at all (for a maximum score of 140) and two open-ended questions regarding their reactions to their Science and Mathematics courses (see Appendix A for the translated items and for the original version of the Questionnaire). This questionnaire is administered and monitored by the evaluation staff of the Project following a pre/post design.

Student mastery of content and thinking skills has been measured in the Project through the use of authentic assessment instruments at two different levels to obtain a composite of ways to look at student performance. These instruments include performance-based items, open-ended questions, portfolios and reflexive diaries among others.

At the first level of assessment, the teachers use these methods as part of their ongoing assessment of student performance and of their assignment of final grades. The students' final grades in Science and Mathematics were included in this study as

an indicator of mastery of content at the classroom level. Students' final grades in were obtained from school records after the students had participated in the Project during one year.

At the second level of assessment, the curricular development staff for Science and Mathematics has designed tests to look at the overall progress of the students participating in the Project and to calibrate the grades assigned by the teachers. The Science test for the seventh grade consists of multiple-choice questions, open-ended questions, and performance-based items designed to test mastery of content and higher-order thinking skills. These tests are administered and scored by personnel from the SSI project. The results from the multiple-choice section of the test (45 items known as "smart bubbles") in Science were included in this study as another indicator of mastery of content (alpha coefficient = 0.81). The results of the comparable test in Mathematics were used for the same purpose.

Because one of the goals of this SSI project is "Science and Mathematics for all students", the educational level of the parents of the participating students was obtained in this study as an indicator of the students' socio-economic background. Data for the parents who had obtained the highest educational level were included since it was assumed that s/he would exert the strongest influence on the household's educational atmosphere. The parents' occupations as reported on school records

were obtained for the students included in the sample when specific information on educational level was missing. The educational requirements for these occupations were obtained from the Directory of Occupational Titles.

The degree of teacher empowerment has been evaluated by looking at the teachers' (1) attitude towards the teaching of Science and Mathematics; and (2) satisfaction with the training to participate in the SS&C/NCTM curriculum; and (3) perceptions of opportunities within and beyond the school settings. These issues have been evaluated through interviews and questionnaires designed for this purpose. The Teacher Empowerment Questionnaire provided a means to quantify this variable and to validate previous findings.

The Teacher Empowerment Questionnaire (see Appendix B for translated items and for original version) was designed based on Short and Rinehart's (1993) for the School Participant Empowerment Scale (SPES). To develop the instrument, a focus group consisting of twenty-three teachers, administrators, and personnel from the SSI project discussed their understanding of empowerment. Their input contributed to the adaptation of the SPES to the local context as suggested in the literature review.

The Teacher Empowerment Questionnaire consists of forty-five statements to which the respondents express their level of agreement on a four point scale ranging from 4 = Very Much Agree to 1 = Very Much Disagree. These items address the

teachers' perceptions of their opportunities for (1) making decisions; (2) professional growth; (3) earning status; (4) self-efficacy; (5) autonomy; and (6) impact. Each respondent obtains a teacher empowerment score for a maximum score of 180.

Results

The students' attitude towards Science and Mathematics has consistently become more positive since the implementation of the project. The following findings summarize the results of the student interviews: (1) they are more motivated to learn Science and Mathematics; (2) they like to do research; (3) they understand better the relationship between Science and Mathematics and their daily lives; (4) they believe that the curricular activities help them to understand better Science and Mathematics; (5) they enjoy feeling "like scientists and mathematicians". The students' scores in the pre and post attitude tests also show some gains in this area although they are not statistically significant.

The students' mastery of content and thinking skills has also consistently improved since the implementation of the project as indicated by the results of the use of authentic assessment strategies. Table 2 presents the summary of the scores in the pre and post tests of attitudes, Science, and Mathematics. The improvement in Mathematics has been more significant than in Science.

Insert Table 2 about here

The students are also obtaining higher grades in Science and Mathematics. Table 3 presents the distribution of the final grades in Science and Mathematics of the students included in this study which is not typical of the traditional classroom since the majority of the students obtained grades of A and B.

Insert Table 3 about here

Table 4 presents the results of the correlations between parents' educational level and the students' scores on the pre-tests for attitudes, Science, and Mathematics. Only one correlation reaches significance levels for all students and another one for the male students. These correlations, although statistically significant, are extremely low.

Insert Table 4 about here

Table 5 presents the results of the correlations between the parents' educational level and the students' scores on the post-tests for attitudes, Science, and Mathematics. These correlations do not reach statistical significance.

Insert Table 5 about here

Table 6 presents the correlations between the students' final grades in Science and Mathematics and their scores on the attitudes, Science, and Mathematics post-tests. There are strong correlations between the final grades in Science and Mathematics and the post-tests in these areas in the analyses regarding all students as well as for the male students which suggest that the classroom assessment and the curricular development assessment are well-calibrated. The final grades in Science and Mathematics of the female students show stronger correlations with their post-test scores in Science than in Mathematics. The strong correlations between the grades in Science and the post-test scores in Mathematics (and vice-versa) suggest the presence of an integration effect across these subjects and highlight the interdependence of skills necessary to master both subject areas thus underlining the importance of coordinating their teaching.

Insert Table 6 about here

Table 7 presents the internal consistency results of the hypothetized sub-scales of the Teacher Empowerment Questionnaire as well as of the total scale. The lowest alpha coefficient corresponds to the sub-scale referring to teacher autonomy.

Insert Table 7 about here

Table 8 presents the summary of the scores obtained by the teachers on the Teacher Empowerment Questionnaire. There were no statistically significant differences in scores by area, grade or gender.

Insert Table 8 about here

Discussion

Students' attitudes as well as mastery of content and thinking skills showed increases contrary to the findings of some investigators (Simpson & Oliver, 1990; Cannon & Simpson, 1985; Simpson & Oliver, 1984). These increases, when examined in light of the data from the interviews conducted with the students and their teachers, could be attributed to the innovative curriculum being implemented in the schools which is designed in congruence with the developmental needs of the students (Eccles-Parsons, et.al, 1982).

The relationship between the parents' educational level and the scores on the pre-tests suggests that the parents are having some influence on their children's attitudes and achievement in Science and Mathematics as suggested by several researchers (Eccles, 1989; Simpson & Troost, 1982; Eccles-Parsons, et.al., 1982). However, the school environment seems to have a strong influence on the achievement of the students as indicated by the lack of correlations between the

parents' educational level and the post-tests. This finding could be attributed to the constructivist emphasis of the new curriculum which allows the students to discover and create their own knowledge considering their developmental level as opposed to more traditional approaches which are teacher-centered.

The parents' educational level could still be contributing to some of the gender differences reported in this study which favor male students (Eccles, 1989; Cannon & Simpson, 1985; Simpson & Oliver, 1984; Willson, 1983; Eccles-Parsons, et.al., 1982). Apparently, parental bias in favor of Mathematics and Science for their sons is still in existence. However, the fact that no relationship was found between parents' educational level and the scores on the post tests of the female students suggests the stronger influence of the school environment on their performance.

The correlations of the measures of attitude change and the measures of mastery of content and thinking skills with the parents' educational level (the indicator for socio-economic background), show that, under the new curriculum, all students tend to obtain more significant gains in Science and Mathematics than under the traditional curriculum where data typically showed biases in favor of students who belong to higher socio-economic backgrounds. Thus, we can conclude that the new curriculum is achieving the goal of Science and Mathematics for all students as it levels the field of opportunities for students from diverse socio-economic backgrounds.

The results of this study suggest that the teachers have become change agents in their schools as they play a more active role in the implementation and evaluation of the curricular reform. These results are consistent with the literature presented earlier in this paper (Heller, 1993). They have reported their self-perceptions as Kirby et.al, (1992) suggested and these are consistent with other sources of information which have been collected throughout the evaluation of this Project. The teachers are receiving institutional support to implement the curriculum and to grow professionally (Clark, 1992; Short & Rinehart, 1992).

The Teacher Empowerment Questionnaire and its sub-scales reflect the empowerment-related issues presented in the literature. Based on the alpha coefficients reported in this study and on the ccorrected item-total correlations obtained for the scale, this is a good instrument to measure teacher empowerment within the context of this SSI in agreement with the suggestions of several investigators who see empowerment as context-dependent (Clark, 1992; Short & Rinehart, 1992; Goldsmith & Nelson, 1991; Rappaport, 1987; Little, 1982).

The teachers' empowerment has consistently increased since the implementation of the project. There is extensive evidence of the professional growth and development experienced by the teachers as documented in the semi-structured interviews conducted with the teachers. As the teachers actively participate in the design and implementation of the curriculum, they become empowered because they have control over the curriculum. As a consequence of the teachers' participation in

the Project, positive changes in interpersonal relationships between the teachers and the directors of the schools have occurred since the teachers see the directors as facilitators of the educational experience and as supportive of their efforts. As the teachers grow professionally, they are developing collegiate relationships with other teachers in their schools.

The teachers are playing a more active role in the decision-making processes at their schools in terms of school organization and program implementation as they become more active in the dissemination process. These changes have been driven by the active participation of the teachers in the curriculum as well as by the training and re-training of teachers who are also participating as trainers in workshops and summer training sessions thus emphasizing the importance of continued education for their professional development. In agreement with Lightfoot (1985), teacher empowerment is seen as a dynamic process because it has an impact on the various components of the system.

Student performance and teacher empowerment were found to be interrelated with the impact of the new curriculum on the school environment. Therefore, clear evidence has been found that the implementation of the curriculum can drive systemic reform.

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Table 1

Description of Teacher Characteristics	
Gender	**Number of Teachers**
Female	40
Male	18
Grade	
Seventh	20
Eighth	16
Ninth	12
Various	9
Years of Experience Teaching	
0-2	9
3-5	8
6-8	8
9-11	6
12-14	8
15-17	6
18-20	4
21-23	6
27 +	1
Area	
Science	32
Mathematics	24
N = 59	

Table 2

Summary of Scores in Pre and Post Tests of Attitudes, Science, and Mathematics

Test	N	Range	Mean	Mode
Pre-Attitudes	184	30-90	66.3	66
Post-Attitudes	223	24-90	67.3	63
Pre-Mathematics	99	1-54	16.6	9
Post-Mathematics	85	4-54	25.9	23
Pre-Science	196	5-35	19.4	17
Post-Science	111	6-41	22.4	17

Table 3

Distribution of Final Grades in Science and Mathematics

	Number of Students	
Grade	Science	Mathematics
A	52	38
B	67	63
C	64	65
D	30	43
F	3	7
	(N = 246)	(N = 216)

Table 4

Correlation Coefficients of Parents' Educational Level and Scores on Pre-tests

Group	Attitudes	Science	Mathematics
All Students	.13	.23*	.17
Gender: Female	.03	.21	.04
Gender: Male	.25*	.17	.25
* = Significant at the .05 level			

Table 5

Correlation Coefficients of Parents' Educational Level and Scores on Post-tests

Group	Attitudes	Science	Mathematics
All students	-.16	.16	.25
Gender: Female	-.24	.14	.14
Gender: Male	-.05	.18	.31

Table 6

Correlation Coefficients of Final Grades and Scores on Post-tests

		Tests		
Group	Area	Attitudes	Science	Mathematics
All students	Mathematics	.18*	.53**	.39**
	Science	.23**	.56**	.50**
Gender: Female	Mathematics	.18	.48**	.24
	Science	.17	.47**	.35*
Gender: Male	Mathematics	.17	.55**	.51
	Science	.31**	.61**	.63**

* = Significant at the .05 level
** = Significant at the .01 level

Table 7

Hypothetical Sub-Scales of the Teacher Empowerment Questionnaire

Sub-Scales	Alpha Coefficient
Status	.65
Self-efficacy	.79
Autonomy	.32
Impact	.80
Decision-Making	.84
Professional Development	.81
Leadership	.84
Overall Scale	.95

Table 8

Summary of Teacher Empowerment Scores

Group	N	Mean
All teachers	58	134.5
Science teachers	32	131.6
Mathematics teachers	23	136.9
Seventh grade	20	134.7
Eighth grade	16	138.2
Ninth grade	12	129.9
Gender: Female	39	133.2
Gender: Male	18	135.8

Appendix A

Questionnaire of Attitudes Towards Science and Mathematics:
Translated Items and Original Version

STUDENT INTEREST IN SCIENCE AND MATHEMATICS

SCALE:

5 = A LOT
4 = QUITE A BIT
3 = SO-SO
2 = A LITTLE
1 = NOTHING
0 = N/A

A. How interesting you found

- Math class
- Science class
- Doing activities in Science
- Doing activities in Math
- Working with schoolmates
- Doing research in Science
- Doing research in Math

B. How easy you found

- Learning Science concepts
- Learning Math concepts
- Solving Science problems
- Solving Math problems

C. How important it is for you to

- Learn more Science
- Learn more Math
- Participate in extracurricular activities related to Science
- Participate in extracurricular activities related to Math

D. How much do you know about the relationship between

- Science and Math
- Daily living and Science
- Daily living and Mathematics
- Science and other subjects
- Math and other subjects

E. How much will you share about Science and Math with

- Your parents
- Your brothers and sisters
- Your friends

F. How much did you enjoy your Science classes last year? Explain.

G. How much did you enjoy your Math classes last year? Explain.

CENTRO DE RECURSOS PARA CIENCIAS E INGENIERIA
PROYECTO DE ALCANCE, SECUENCIA Y COORDINACION

Nombre o número
de identificación :_____

Grado:_____

Sexo; ____ Femenino ____ Masculino

CUESTIONARIO SOBRE INTERES EN CIENCIAS Y MATEMATICAS

Haz un círculo alrededor del número que mejor describa cómo te has sentido en relación a las ciencias y las **matemáticas** durante **este año.**

	MUCHO	BASTANTE	REGULAR	POCO	NADA	NO APLICA
A. Lo interesante que encontraste:						
las clases de **matemáticas**	5	4	3	2	1	0
las clases de **ciencia**	5	4	3	2	1	0
hacer actividades prácticas de **ciencia**	5	4	3	2	1	0
hacer actividades prácticas de **matemáticas**	5	4	3	2	1	0
trabajar con otros compañeros	5	4	3	2	1	0
hacer investigación en ciencia	5	4	3	2	1	0
hacer investigación en **matemáticas**	5	4	3	2	1	0
B. Lo fácil que te resultó:						
aprender conceptos de ciencia	5	4	3	2	1	0
aprender conceptos de **matemáticas**	5	4	3	2	1	0
solucionar problemas en ciencia	5	4	3	2	1	0
solucionar problemas en **matemáticas**	5	4	3	2	1	0

BEST COPY AVAILABLE

	MUCHO	BASTANTE	REGULAR	POCO	NADA	NO APLICA
C. La importancia que le has dado a:						
aprender más ciencia	5	4	3	2	1	0
aprender más matemáticas	5	4	3	2	1	0
participar en actividades extracurriculares en ciencia	5	4	3	2	1	0
participar en actividades extracurriculares en matemáticas	5	4	3	2	1	0
D. Lo que conocías sobre la relación entre:						
las ciencias y las matemáticas	5	4	3	2	1	0
la vida diaria y la ciencia	5	4	3	2	1	0
la vida diaria y las matemáticas	5	4	3	2	1	0
las ciencias y otras materias	5	4	3	2	1	0
las matemáticas y otras materias	5	4	3	2	1	0
E. Lo que comparas sobre ciencias y matemáticas con:						
tus padres	5	4	3	2	1	0
tus hermanos	5	4	3	2	1	0
tus amigos	5	4	3	2	1	0

II.

1. ¿Cómo te han gustado las clases de ciencias que has tenido durante este año? Explica

2. ¿Cómo te han gustado las clases de matemáticas que has tenido durante este año? Explic

Appendix B
Teacher Empowerment Questionnaire:
Translated Items and Original Version

Centro De Recursos Para Ciencias e Ingeniería
PR-SSI

Cuestionario de Apotestamiento de Maestros

Escuela: _____

Grado: _____

Area: _____

Años de experiencia enseñando: _____

Sexo: _____ Femenino _____ Masculino

Como parte de la evaluación del Proyecto PR-SSI, hemos desarrollado este instrumento para evaluar el nivel de apotestamiento de los maestros.

Primera Parte: Favor de utilizar la siguiente escala para responder a los reactivos que aparecen a continuación en la hoja de contestaciones ennegreciendo la letra correspondiente.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

1. Participación en la toma de decisiones

1. Se me ha dado la oportunidad de monitorear programas.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

2. Me desempeño en un ambiente profesional.

A B C D E

3. Siento que me respetan como profesional en la escuela.

A B C D E

4. Me siento motivado/a para buscar información adicional en mi área de acuerdo a las necesidades de mis estudiantes.

A B C D E

5. Puedo tomar decisiones acerca del currículo.

A B C D E

6. Me considero una persona que toma decisiones acerca de la implantación de nuevos programas y proyectos educativos en la escuela.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

7. Puedo tomar decisiones acerca de la implantación de nuevos programas y proyectos educativos en la escuela.

A B C D E

8. Percibo el respeto y respaldo de mis colegas.

A B C D E

9. Considero que estoy ayudando a los estudiantes a convertirse en aprendices independientes.

A B C D E

10. Me siento motivado/a para adaptar el currículo que utilizo.

A B C D E

11. Me siento motivado/a para promover cambios en la educación.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

12. Puedo tomar decisiones acerca de la selección de otros maestros para la escuela.

A B C D E

13. Tengo la oportunidad de crecer profesionalmente.

A B C D E

14. Tengo control sobre el contenido y la forma de enseñanza en mis clases.

A B C D E

15. Me considero un modelo efectivo para mis estudiantes.

A B C D E

16. Tengo una buena base de conocimientos en las áreas que enseño.

A B C D E

17. Estoy fomentando que mis estudiantes integren el conocimiento de varias disciplinas.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

18. Participo en la toma de decisiones presupuestarias de mi escuela.

A B C D E

19. Me siento motivado/a para mantenerme al día en mi disciplina.

A B C D E

20. Se solicitan mis servicios para adiestrar a otros maestros en mi área de especialidad.

A B C D E

21. Considero que estoy contribuyendo a apotestar a mis estudiantes.

A B C D E

22. Me siento motivado/a para asistir a trabajar regularmente.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

23. Entiendo que mi trabajo en el salón de clases tiene impacto en la comunidad a la que sirve mi escuela.

A B C D E

24. He tenido la oportunidad de enseñarle a otros maestros en mi escuela sobre ideas innovadoras en proceso de enseñanza y avaluación.

A B C D E

25. Tengo la oportunidad de tomar cursos en educación continua.

A B C D E

26. Estoy muy comprometido/a con un programa educativo importante para los estudiantes.

A B C D E

27. Puedo seleccionar el método de enseñanza que voy a utilizar para enseñar a mis estudiantes.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

28. Participo en el desarrollo profesional del equipo de trabajo en mi escuela.

A B C D E

29. Puedo escoger mi propio horario de clases.

A B C D E

30. Me siento motivado/a para solicitar información y asesoramiento de mis colegas cuando lo necesito.

A B C D E

31. Estoy viendo a los estudiantes progresar académicamente.

A B C D E

32. Considero que tengo la capacidad para lograr que se lleven a cabo las tareas planificadas.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

33. Principales, maestros y personal escolar solicitan mi orientación en torno a diversos asuntos relacionados con mi escuela.

A B C D E

34. Tengo la oportunidad de colaborar con otros maestros de mi escuela para llevar a cabo diversas actividades de enriquecimiento profesional.

A B C D E

35. Entiendo que tengo la oportunidad de ejercer influencia sobre los demás.

A B C D E

36. Otras personas en la escuela solicitan mis consejos.

A B C D E

37. Me siento motivado/a para estimular a mis colegas a superarse profesionalmente.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

38. Estoy fomentando el desarrollo de destrezas de liderato entre mis colegas.

A B C D E

39. En nuestra escuela, los estudiantes son la primera prioridad.

A B C D E

40. Considero que causo impacto en los otros maestros y en los estudiantes.

A B C D E

41. Me considero capacitado/a para servir de recurso para el desarrollo profesional de mis colegas.

A B C D E

42. Participo en esfuerzos para diseminar el currículo y estrategias de enseñanza.

A B C D E

43. Estoy fomentando el desarrollo de destrezas de liderato en mis estudiantes.

A B C D E

Favor de pasar a la próxima página.

Muy Acuerdo	De Acuerdo	En Desacuerdo	Muy En Desacuerdo	No Aplica
A	B	C	D	E

44. Dependo poco de un texto para dar mis clases.

A B C D E

45. Me siento muy cómodo implantando el currículo.

A B C D E

Muchas Gracias.

Teacher Empowerment Questionnaire: Translated Items

1. I have had the opportunity to monitor programs.
2. I work in a professional environment.
3. I am respected as a professional in my school.
4. I am motivated to look for additional information in my area according to the needs of my students.
5. I can make decisions about the curriculum.
6. I see myself as someone who makes decisions about the implantation of new programs and educational projects in the school.
7. I can make decisions about the implantation of new programs and educational projects in the school.
8. I am receiving respect and support from my colleagues.
9. I believe that I am contributing to help the students to become independent learners.
10. I am motivated to adapt the curriculum.
11. I am motivated to foster educational change.
12. I can make decisions about the selection of teachers for the school.
13. I have the opportunity to grow professionally.
14. I have control over the content and teaching in my classes.
15. I see myself as an effective role model for my students.
16. I have a strong knowledge base in my area.

17. I am fostering the integration of knowledge from various disciplines by my students.
18. I participate in budget decisions in my school.
19. I am motivated to keep myself up to date in my discipline.
20. I am requested to train other teachers in my area of expertise.
21. I believe that I am contributing to empower my students.
22. I am motivated to go to work on a regular basis.
23. I understand that my work in the classroom has an impact on my school's community.
24. I have had the opportunity to train other teachers in my school about innovative teaching and assessment strategies.
25. I have the opportunity to take continued education courses.
26. I am very committed to an important educational program for my students.
27. I can choose the method which I will use to teach my students.
28. I participate in the professional development of my school's staff.
29. I can choose my own class schedule.
30. I am motivated to ask my colleagues for advice and information when I need them.
31. I am seeing the students make academic progress.
32. I believe that I have the ability to complete planned tasks.

33. Principals, teachers, and other school personnel ask for my advice regarding various issues related to the school.
34. I have the opportunity to collaborate with my colleagues in professional development activities.
35. I believe that I have the opportunity to influence others.
36. Other people in the school ask for my advice.
37. I am motivated to stimulate my colleagues to grow professionally.
38. I am fostering leadership skills among my colleagues.
39. Students are the first priority in my school.
40. I believe that I am having an impact on other teachers and on the students.
41. I am qualified to serve as a resource for the professional development of my colleagues.
42. I participate in the dissemination efforts of the curriculum and teaching strategies.
43. I am fostering leadership skills among my students.
44. I hardly rely on a textbook to teach my classes.
45. I am very comfortable implementing the curriculum.

Notes

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